



Receipt #2

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Attorney's Docket No. 032292-029

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In re Patent Application of )  
Steffen DALGARD ) Group Art Unit: 2152  
Application No.: 09/996,688 ) Examiner: Unassigned  
Filed: November 30, 2001 )  
For: METHOD AND ARRANGEMENT )  
PROVIDING A VIRTUAL )  
CONTINUOUS CONNECTION )

RECEIVED  
FEB 14 2002

CLAIM FOR CONVENTION PRIORITY

Technology Center 2100

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

The benefit of the filing date of the following prior foreign application in the following foreign country is hereby requested, and the right of priority provided in 35 U.S.C. § 119 is hereby claimed:

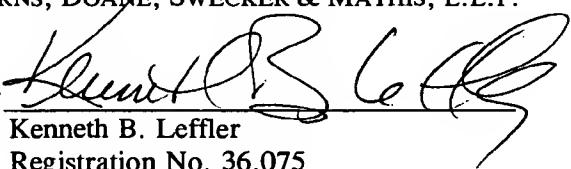
Norwegian Patent Application No. 20006127

Filed: December 1, 2000

In support of this claim, enclosed is a certified copy of said prior foreign application. Said prior foreign application was referred to in the oath or declaration. Acknowledgment of receipt of the certified copy is requested.

Respectfully submitted,

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# KONGERIKET NORGE

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## Bekreftelse på patentsøknad nr

*Certification of patent application no*

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Det bekreftes herved at vedheftede dokument er nøyaktig utskrift/kopi av ovennevnte søknad, som opprinnelig inngitt 2000.12.01

*It is hereby certified that the annexed document is a true copy of the above-mentioned application, as originally filed on 2000.12.01*

2001.10.04

*Freddy Strømmen*

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Seksjonsleder

*Line Reum*

Line Reum



**PATENTSTYRET**  
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1d

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00-12-01\*20006127

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1. desember 2000

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Tittel:

Fremgangsmåte og arrangement for å tilveiebringe en virtuelt  
kontinuerlig forbindelse

Fullmektig:

Oslo Patentkontor AS, Postboks 7007 M, N-0306 Oslo

### Field of the invention

The present invention is related to data communication networks, and in particular a dial up solution in data communication networks using a protocol stack like TCP/IP.

### Background of the invention

The ability for a data communication network to communicate with other networks are almost always required. The chosen connection utilized in this communication is a balance between cost and need. For example, for some applications, a continuous, fixed connection, e.g. a cable exclusive for that purpose may be provided. Fig. 1 shows an example of such a connection between system A and system B, both using TCP/IP and PPP(Point to Point Protocol) divided into the four lowest layers of the OSI model. However, this is a quite expensive solution, and it is only defensible if the connection is in operation at nearly all times.

Thus, a telephone network, e.g. PSTN (Public Switched Telecommunication Network), GSM (Global System for Mobile communication) or ISDN (Integrated Services Digital Network) used as interconnection may be more convenient. Continuous connection is made by using dial up modems connected to and compatible for the actual telephone network. Fig. 2 shows the system of Fig. 1 wherein the fixed cable is replaced with a telephone network and a compatible modem.

In case of a telephone network, there must be a dial up support in addition to a protocol stack (e.g. TCP/IP) and a layer 2 protocol (e.g. PPP).

In prior art, this dial up support is integrated in layer 3, e.g. the IP -layer (Fig. 3). Normally, the IP layer includes a forwarding table which has a logical connection between a destination address and the interface to which IP packets are sent. An example of such a table is shown in table 1.

Network address	Network mask	Use interface
10.10.10.0	255.255.255.0	PPP
10.10.30.0	255.255.255.0	ETH
10.10.40.0	255.255.255.0	PPP

Table 1: A forwarding table in an IP layer

To extend this for dial out, the table also has a logical connection between a destination address and a telephone number. The telephone number is dialed when an IP-packet is forwarded. There may be more telephone numbers than modems, if not all connections need to be active at the same time.

Network address	Network mask	Use number
10.10.10.0	255.255.255.0	12345678
10.10.40.0	255.255.255.0	004612345678

Table 2: A forwarding table in an IP layer including telephone numbers  
The extended functionality is implemented as part of the IP layer (L3) (Fig. 3).

The problem with the above mentioned solution is that third party router stack implementations, e.g. TCP/IP, generally

do not provide dial up support as an integrated part of the layer 3 implementation, e.g. IP layer implementation, and for an integration, a major redesign is necessary.

In addition, a dial up extended function integrated in layer 3 may result in periods during the dial up connection in which no data is being sent. This is an inefficient way of utilizing the telephone network which may result in unnecessary costs.

#### Summary of the invention

It is an object of the present invention to provide an arrangement that eliminates the drawbacks described above. The features defined in the claims enclosed characterize this method.

More specifically, the present invention provides a method and an arrangement for connection between different communication systems through a telephone network. In an OSI layered system, the connection is established using a dial up modem compatible with the actual telephone system. A modem control logic is integrated in layer 2, and simulates a continuous connection towards layer 3.

#### Brief description of the drawings

In order to make the invention more understandable, the discussion that follows will refer to the accompanying drawings.

Fig. 1 shows a fixed cable connection between two systems using TCP/IP protocol stack and PPP layer 2 protocol.

Fig. 2 shows the two systems of Fig.1 connected through a telephone network by using a modem compatible with the telephone network.

Fig. 3 shows system A of Fig. 1 connected to other systems by using a modem compatible with the telephone network including an extended dial up function integrated in the IP layer.

5 Fig. 4 is a closer view of system A according to the present invention with a modem control logic integrated in the PPP layer.

Fig. 5 shows system A according to the present invention including a dial up extended function in the IP layer and a 10 modem control logic in the PPP layer connected to system B through a telephone network.

#### An example embodiment of the present invention

The present invention will now be described in conjunction with an example embodiment. However, the present invention 15 is not limited to this particular embodiment, but may be used in other applications with various substitutions without departing from the scope of the invention as defined in the enclosed claims.

In the example discussed, the system is divided into layers 20 according to the OSI model wherein the protocols TCP, IP and PPP are used in layer 4 (L4) layer 3 (L3) and layer 2 (L2), respectively.

According to the present invention, all the dial up functionality is isolated in PPP (L2), and the IP (L3) may 25 be left unchanged.

The original PPP (L2) function is extended with a modem control logic that hides the dial up functionality for IP (L3). This new extended PPP module is called "DIAL-UP PPP", and simulate a continuous connection seen from the IP (L3).

"DIAL-UP PPP" (L2) provides a virtually continuous connection, because the dial-up functionality is not seen by IP (L3).

5 All messages to "DIAL-UP PPP" from IP are sensed by the modem control logic which initiates a dial out.

The modem control logic may have timers for closing the dial out connection if there are no more messages. The IP (L3) may still believe that there is an open connection to the destination of the last transmitted message. When a 10 subsequent message belonging to the same virtual connection is transmitted from the IP layer, a new dial out will be required, but this will automatically be initiated by the modem control logic, and will not affect the IP (L3) or any of the upper layers.

15 For dial in, the call may be answered by the control logic, and the message is sent to IP by "DIAL-UP PPP".

Since the upper layers is intended to experience this as a continuous connection, the same number has to be dialled every time within the same virtual connection.

20 Synchronisation with the remote PPP driver has to be done in a way that do not disturb the upper layers, so that the upper layer at any time will experience synchronous data flow.

#### **Abbreviations**

25 ETH Ethernet

PPP Point to Point Protocol

TCP Transmission Control Protocol

UDP User Datagram Protocol

IP Internet Protocol



## P a t e n t   c l a i m s

1. A method in a data communication network for continuous connection between a first system to other systems in said data communication network, said first system divided into layers according to the Open System Interconnection (OSI), OSI layer 2 (L2) using a first protocol, OSI layer 3 and 4 (L3 and L4) using a second protocol, said connection provided by a telephone network connected to said first system by a modem or similar means compatible with said telephone network,

10 c h a r a c t e r i z e d   i n :

- establishing said continuous connection on L3 with a second system by means of a control logic integrated with said first protocol in L2 by establishing a temporary connection with said second system on L2,
- closing said temporary connection when a timer in said control logic elapses, still maintaining said continuous connection,
- re-establishing said temporary connection when a new message within said continuous connection is sent from L3 to L2,
- executing incoming messages by means of said control logic and sending them to L3.

2. A method as defined in claim 1,

25 c h a r a c t e r i z e d   i n   that said establishment and reestablishment of said temporary connection comprising dial up to said second system by means of said modem or similar means through said telephone network.

3. A method as defined in claim 1 or 2,

30 c h a r a c t e r i z e d   i n   that said first protocol is a Point to Point Protocol (PPP).

4. A method as defined in any of the preceding claims, characterized in that said second protocol is a TCP/IP protocol.

5. A method as defined in any of the preceding claims, characterized in the step of resetting said timer each time a message is received from L3 to L2.

6. A method as defined in any of the preceding claims, characterized in that said control logic is installed in a driver in L2 connected to said modem or similar means.

7. A method as defined in any of the preceding claims, characterized in that said telephone network is a PSTN, ISDN or a GSM network.

8. An arrangement in a data communication network for continuous connection between a first system to other systems in said data communication network, said first system divided into layers according to the Open System Interconnection (OSI), OSI layer 2 (L1) using a first protocol, OSI layer 3 and 4 (L3 and L4) using a second protocol, said connection provided by a telephone network connected to said first system by a modem or similar means compatible with said telephone network, characterized in a control logic integrated with said first protocol in L2 for establishing said continuous connection with said second system on L2 by means of a temporary connection, said control logic closing said temporary connection when a timer in said control logic elapses, still maintaining said continuous connection, said control logic re-establishing said temporary connection when a new message within said continuous connection is sent from L3 to L2, said control logic executing incoming messages and transferring them to L3.

9. An arrangement as defined in claim 8,  
characterized in that said establishment  
and reestablishment of said temporary connection comprising  
dial up to said second system by means of said modem or  
similar means through said telephone network.

10. An arrangement as defined in claim 8 or 9,  
characterized in that said first protocol  
is a Point to Point Protocol (PPP).

11. An arrangement as defined in claims 8-10,  
characterized in that said second protocol  
is a TCP/IP protocol.

12. An arrangement as defined in claims 8-11,  
characterized in the step of resetting said  
timer each time a message is received from L3 in L2.

13. An arrangement as defined in claims 8-12,  
characterized in that said control logic is  
installed in a driver in L2 connected to said modem or  
similar means.

14. An arrangement as defined in claims 8-12,  
characterized in that said  
telephone network is a PSTN, ISDN or a GSM network.



## A b s t r a c t

The present invention is related to data communication networks using a modem and a telephone network e.g. ISDN, PSTN or GSM for interconnection between systems. A control logic is included in the layer 2 protocol which is closing the temporary connection on layer 2 each time a timer elapses and re-establishing it when a new subsequent message from layer 3 is transmitted. The timer is being reset each time a message is transmitted. However, seen from layer 3 the control logic in layer 2 provides a continuous connection even if the actual connection is alternating. Thus, unnecessary time spent in the telephone network when no data is being transmitted will be minimized.



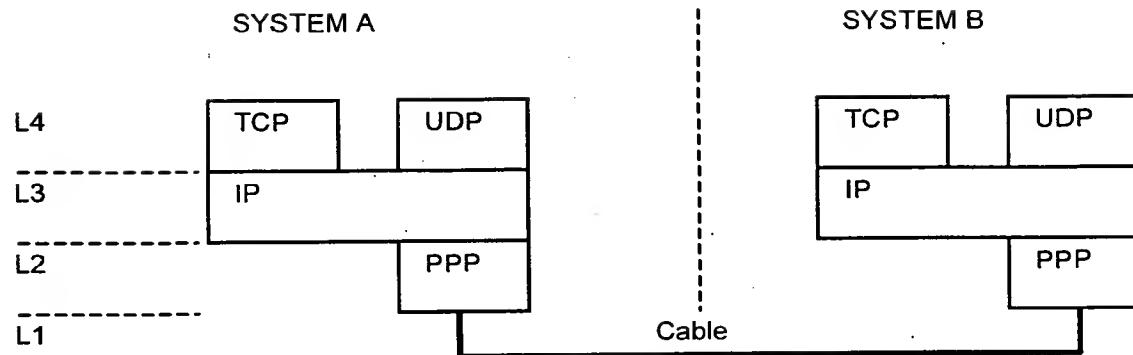


Figure 1

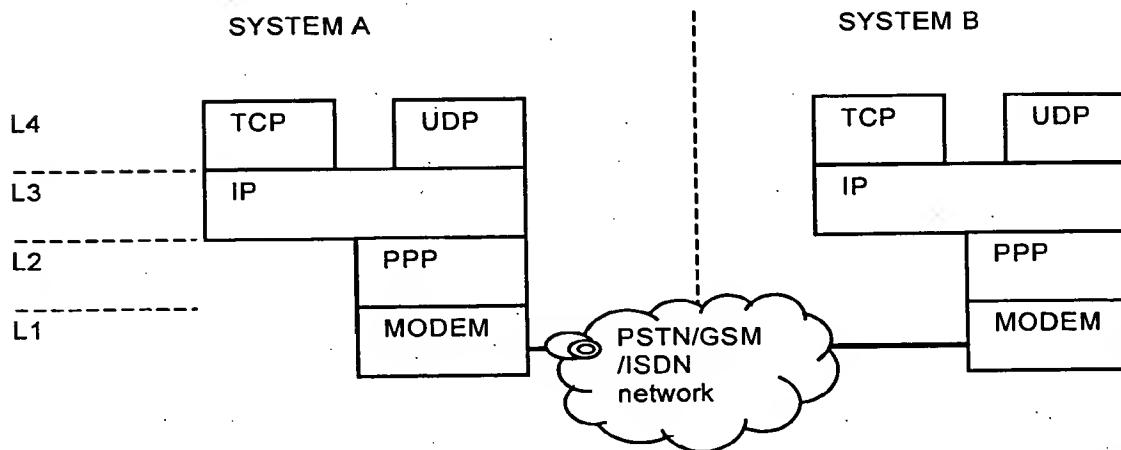


Figure 2



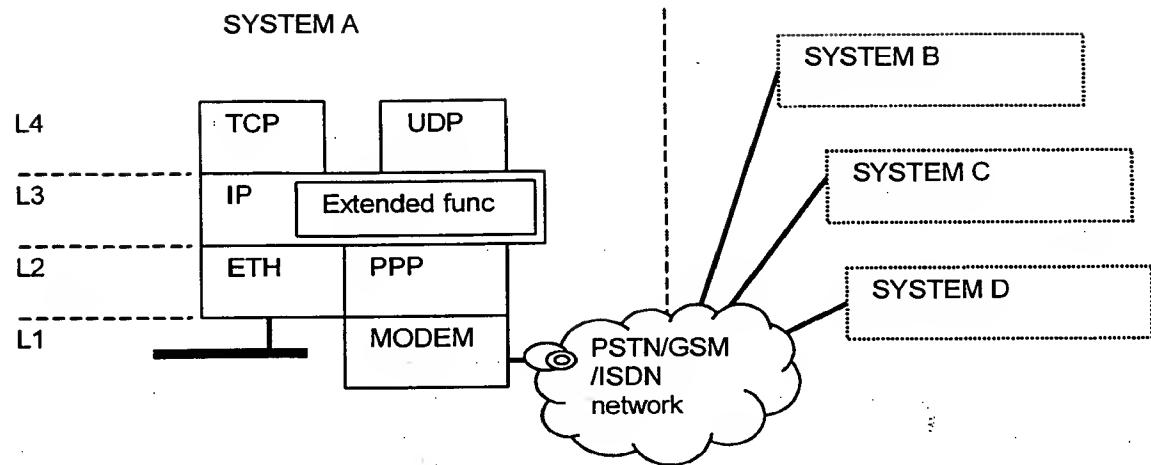


Figure 3

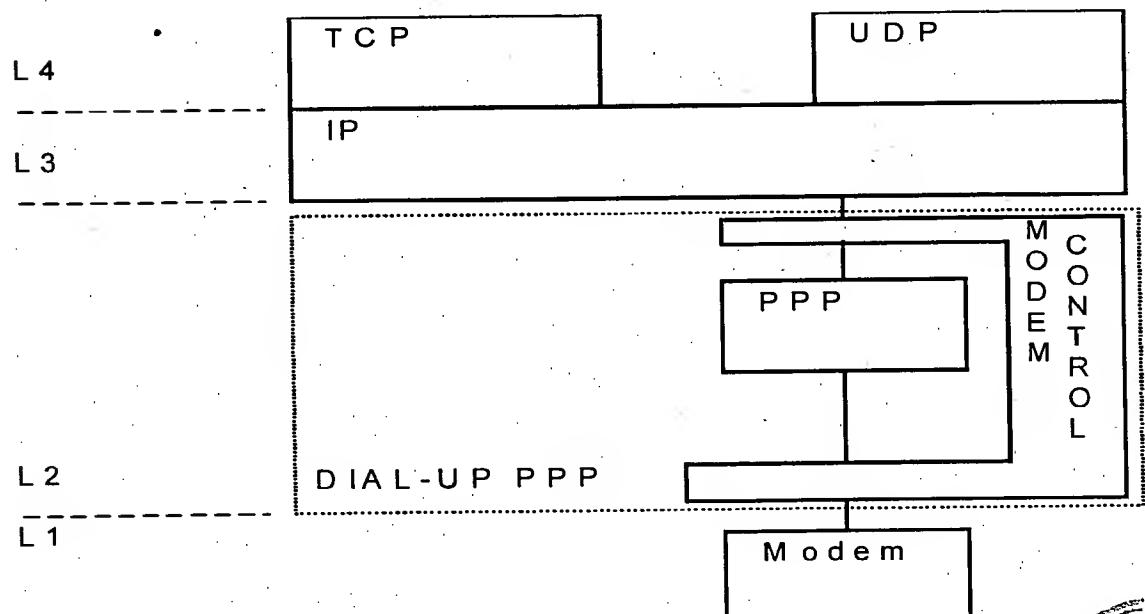


Figure 4



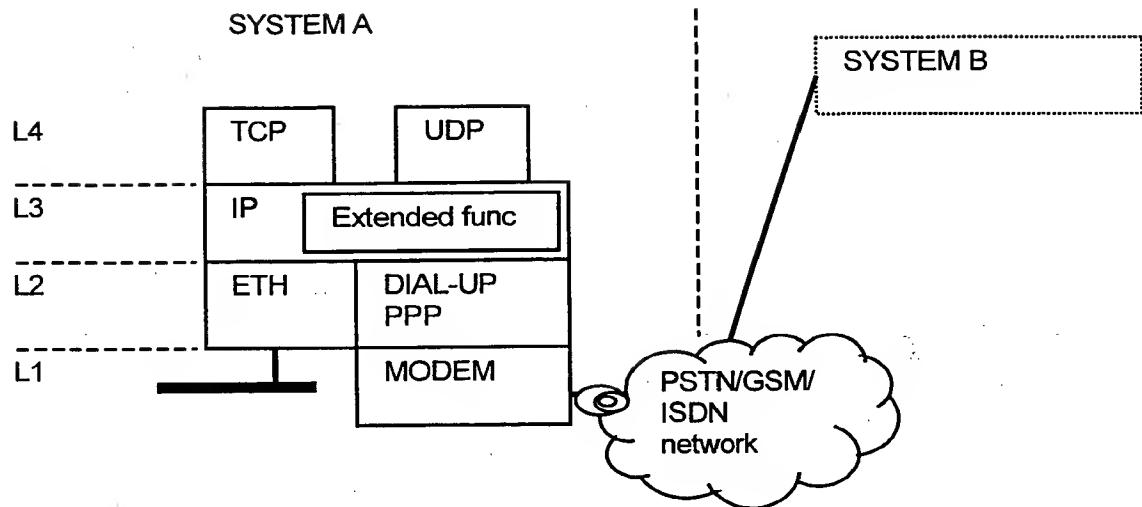


Figure 5

